

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111**AMENDMENTS TO THE CLAIMS**

Please amend the claims as set forth hereinbelow.

1. **(currently amended)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component.
2. **(original)** The optical device of Claim 1, the transmission optical waveguide being a low-index optical waveguide.
3. **(original)** The optical device of Claim 2, the transmission optical waveguide being a fiber-optic transmission waveguide, the fiber-optic transmission waveguide being adapted for transverse-coupling with the optical device component.
4. **(currently amended)** The optical device of Claim 3, the transmission fiber-optic waveguide being adapted for ~~at least one of~~ receiving optical signal power from a fiber-optic telecommunications system ~~[[and]]~~ or transmitting optical signal power to a fiber-optic telecommunications system.
5. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,

Faxed to 703-872-9306 on 08/16/2004

Page 2 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,

the transmission fiber-optic waveguide including a fiber-optic-taper segment, the fiber-optic-taper segment being transverse-coupled to the optical device component.

6. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and
 - an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
- the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
- the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
- the transmission optical waveguide being a low-index planar lightwave transmission optical waveguide.
7. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and

Faxed to 703-872-9306 on 08/16/2004

Page 3 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure being adapted for passive modal-index-matching between the transmission optical waveguide and the multi-layer waveguide structure.

8. **(withdrawn)** The optical device of Claim 7, the multi-layer waveguide structure including high-index material, the transmission optical waveguide being a low-index transmission optical waveguide.
9. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide

Faxed to 703-872-9306 on 08/16/2004

Page 4 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure being adapted for passive modal-index-matching between the transmission optical waveguide and the multi-layer waveguide structure, the multi-layer waveguide including high-index material, the transmission optical waveguide being a transmission fiber-optic waveguide including a fiber-optic-taper segment, the fiber-optic-taper segment being transverse-coupled to the multi-layer waveguide structure.

10. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack, the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure being adapted for passive modal-index-matching between the transmission optical waveguide and the multi-layer waveguide structure, the multi-layer waveguide structure including high-index material, the transmission optical waveguide being a low-index planar lightwave transmission optical waveguide.
11. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and

Faxed to 703-872-9306 on 08/16/2004

Page 5 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,

the multi-layer waveguide structure being adapted for passive modal-index-matching between the transmission optical waveguide and the multi-layer waveguide structure,

the multi-layer waveguide structure being adapted for integration into an integrated optical device, the multi-layer waveguide structure being adapted for substantially completely transferring optical signal power between the transmission optical waveguide and the multi-layer waveguide structure, the multi-layer waveguide structure being thereby adapted to function as ~~at least one of~~ a passive input coupler ~~[[and]]~~ or a passive output coupler between the transmission optical waveguide and the integrated optical device.

12. **(currently amended)** An optical device, comprising:
- a transmission optical waveguide; and
- an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

Faxed to 703-872-9306 on 08/16/2004

Page 6 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure including an active layer, the active layer including ~~at least one of~~ an electro-active layer ~~[[and]]~~ or a non-linear-optical layer, the multi-layer waveguide structure being adapted so that varying a control signal applied to the active layer results in ~~at least one of~~ varying optical loss ~~[[and]]~~ or varying modal-index for the multi-layer waveguide structure.

13. **(currently amended)** The optical device of Claim 12, the multi-layer waveguide structure including at least one electro-active layer, the electro-active layer including ~~at least one of~~ an electro-optic layer ~~[[and]]~~ or an electro-absorptive layer, the multi-layer waveguide structure including a pair of electrical contact layers with the electro-active layer therebetween, the control signal being an electronic control signal applied through the electrical contact layers.
14. **(original)** The optical device of Claim 12, the multi-layer waveguide structure including at least one non-linear-optical layer, the control signal being an optical control signal applied to the non-linear-optical layer.
15. **(original)** The optical device of Claim 12, the multi-layer waveguide structure including high-index material, the transmission optical waveguide being a low-index transmission optical waveguide, the multi-layer waveguide structure being adapted for active modal-index-matching with the low-index transmission optical waveguide in response to the control signal.
16. **(currently amended)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,

Faxed to 703-872-9306 on 08/16/2004

Page 7 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,

the multi-layer waveguide structure including an active layer, the active layer including ~~at least one of~~ an electro-active layer ~~[[and]]~~ or a non-linear-optical layer, the multi-layer waveguide structure being adapted so that varying a control signal applied to the active layer results in ~~at least one of~~ varying optical loss ~~[[and]]~~ or varying modal-index for the multi-layer waveguide structure,

the multi-layer waveguide including high-index material, the transmission optical waveguide being a transmission fiber-optic waveguide including a fiber-optic-taper segment, the fiber-optic-taper segment being transverse-coupled to the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for active modal-index-matching with the fiber-optic-taper segment in response to the control signal.

17. **(currently amended)** An optical device, comprising:
- a transmission optical waveguide; and
- an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
- the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
- the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
- the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide

Faxed to 703-872-9306 on 08/16/2004

Page 8 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure including an active layer, the active layer including ~~at least one of~~ an electro-active layer ~~[[and]]~~ or a non-linear-optical layer, the multi-layer waveguide structure being adapted so that varying a control signal applied to the active layer results in ~~at least one of~~ varying optical loss ~~[[and]]~~ or varying modal-index for the multi-layer waveguide structure,

the multi-layer waveguide structure including high-index material, the transmission optical waveguide being a low-index planar lightwave transmission optical waveguide, the multi-layer waveguide structure being adapted for active modal-index-matching with the low-index planar lightwave transmission optical waveguide in response to the control signal.

18. **(currently amended)** An optical device, comprising:
- a transmission optical waveguide; and
- an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
- the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
- the multi-layer waveguide structure including an active layer, the active layer including ~~at least one of~~ an electro-active layer ~~[[and]]~~ or a non-linear-optical layer, the multi-layer waveguide structure being adapted so that varying a control signal applied to the active layer results in ~~at least one of~~ varying

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

optical loss ~~[[and]]~~ or varying modal-index for the multi-layer waveguide structure,

the multi-layer waveguide structure being adapted for integration into an integrated optical device, the multi-layer waveguide structure being adapted for substantially modal-index-matching with the transmission optical waveguide in response to the control signal so as to substantially completely transfer optical signal power between the transmission optical waveguide and the multi-layer waveguide structure in response to the control signal, the multi-layer waveguide structure being thereby adapted for functioning as ~~at least one of~~ an active input coupler ~~[[and]]~~ or an active output coupler between the transmission optical waveguide and the integrated optical device.

19. **(currently amended)** An optical device, comprising:
- a transmission optical waveguide; and
 - an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
 - the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
 - the multi-layer waveguide structure including an active layer, the active layer including ~~at least one of~~ an electro-active layer ~~[[and]]~~ or a non-linear-optical layer, the multi-layer waveguide structure being adapted so that varying a control signal applied to the active layer results in ~~at least one of~~ varying optical loss ~~[[and]]~~ or varying modal-index for the multi-layer waveguide structure,

Faxed to 703-872-9306 on 08/16/2004

Page 10 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the multi-layer waveguide structure being adapted for substantially completely transferring optical signal power between the transmission optical waveguide and the multi-layer waveguide structure in response to a first control signal level, the multi-layer waveguide structure being adapted for substantially preventing optical signal power transfer between the transmission optical waveguide and the multi-layer waveguide structure in response to a second control signal level, the optical device being thereby adapted for functioning as an optical switch.

20. **(currently amended)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure including an active layer, the active layer including ~~at least one of~~ an electro-active layer ~~[[and]]~~ or a non-linear-optical layer, the multi-layer waveguide structure being adapted so that varying a control signal applied to the active layer results in ~~at least one of~~ varying optical loss ~~[[and]]~~ or varying modal-index for the multi-layer waveguide structure,
the multi-layer waveguide structure being adapted for allowing substantially maximal transmission of optical signal power through the transmission optical waveguide in response to a first control signal level, the multi-layer waveguide structure being adapted for allowing substantially minimal transmission of

Faxed to 703-872-9306 on 08/16/2004

Page 11 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

optical signal power through the transmission optical waveguide in response to a second control signal level, the multi-layer waveguide structure being adapted for allowing an intermediate transmission level of optical signal power through the transmission optical waveguide in response to an intermediate control signal level, the optical device being thereby adapted for functioning as ~~at least one of~~ an optical modulator ~~[[and]]~~ or a variable optical attenuator.

21. **(original)** The optical device of Claim 20, the multi-layer waveguide structure being adapted for exhibiting varying modal-index in response to varying control signal level.
22. **(original)** The optical device of Claim 20, the multi-layer waveguide structure being adapted for exhibiting varying optical loss in response to varying control signal level.
23. **(currently amended)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure being positioned on a substrate, layers of the multi-layer waveguide structure being substantially parallel to the substrate.
24. **(original)** The optical device of Claim 23, the multi-layer reflector stack comprising a distributed Bragg reflector stack.

Faxed to 703-872-9306 on 08/16/2004

Page 12 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

25. **(original)** The optical device of Claim 23, the multi-layer waveguide structure being fabricated at least in part by deposition of layers on the substrate.
26. **(original)** The optical device of Claim 23, the multi-layer waveguide structure including a single multi-layer reflector stack, the multi-layer waveguide structure being thereby adapted for guiding a surface-guided optical mode.
27. **(original)** The optical device of Claim 23, the multi-layer waveguide structure including two multi-layer reflector stacks and a core layer therebetween, the multi-layer waveguide structure being thereby adapted for guiding an optical mode along the core layer.
28. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure being positioned on a substrate, layers of the multi-layer waveguide structure being substantially parallel to the substrate,
the multi-layer waveguide structure including a ridge-like waveguide structure protruding from the substrate formed by spatially-selective removal of material of lateral portions of the multi-layer waveguide structure.
29. **(withdrawn)** The optical device of Claim 28, the material being removed substantially completely down to the substrate.

Faxed to 703-872-9306 on 08/16/2004

Page 13 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

30. **(withdrawn)** The optical device of Claim 28, the material being only partially removed.
31. **(withdrawn)** The optical device of Claim 28, the material being removed substantially symmetrically from lateral portions of the multi-layer waveguide structure.
32. **(withdrawn)** The optical device of Claim 28, the material being removed asymmetrically from lateral portions of the multi-layer waveguide structure.
33. **(withdrawn)** The optical device of Claim 28, the transmission optical waveguide being transverse-coupled at a side surface of the multi-layer waveguide structure.
34. **(withdrawn)** The optical device of Claim 28, the transmission optical waveguide being transverse-coupled at a top surface of the multi-layer waveguide structure.
35. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system [[and]] or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure being positioned on a substrate, layers of the multi-layer waveguide structure being substantially parallel to the substrate,

Faxed to 703-872-9306 on 08/16/2004

Page 14 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

at least one layer of the multi-layer waveguide structure being provided with a lateral lower-index portion.

36. **(withdrawn)** The optical device of Claim 35, the lateral lower-index portion being provided on only one side of the multi-layer waveguide structure.
37. **(withdrawn)** The optical device of Claim 35, the lateral lower-index portion being provided on both sides of the multi-layer waveguide structure.
38. **(withdrawn)** The optical device of Claim 35, the lateral lower-index portion being provided by physical modification of at least one lateral portion of at least one layer.
39. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system [[and]] or transmitting optical signal power to the optical signal transmission system,
the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure being positioned on a substrate, layers of the multi-layer waveguide structure being substantially parallel to the substrate,
at least one layer of the multi-layer waveguide structure being provided with a lateral lower-index portion,
the lateral lower-index portion being provided by deposition of lower-index material.
40. **(withdrawn)** An optical device, comprising:

Faxed to 703-872-9306 on 08/16/2004

Page 15 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure being positioned on a substrate, layers of the multi-layer waveguide structure being substantially parallel to the substrate, at least one layer of the multi-layer waveguide structure being provided with a lateral lower-index portion,
the lateral lower-index portion being provided by chemical modification of at least one lateral portion of at least one layer.

41. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide

Faxed to 703-872-9306 on 08/16/2004

Page 16 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure being positioned on a substrate, layers of the multi-layer waveguide structure being substantially perpendicular to the substrate.

42. **(withdrawn)** The optical device of Claim 41, the multi-layer reflector stack comprising a distributed Bragg reflector stack.
43. **(withdrawn)** The optical device of Claim 41, the multi-layer waveguide structure including two multi-layer reflector stacks and a core layer therebetween, the multi-layer waveguide structure being thereby adapted for guiding an optical mode along the core layer.
44. **(withdrawn)** The optical device of Claim 41, the multi-layer waveguide structure being formed by spatially-selective processing of waveguide material deposited on the substrate.
45. **(withdrawn)** The optical device of Claim 41, the transmission optical waveguide being transverse-coupled to the multi-layer waveguide structure at a side surface thereof.
46. **(withdrawn)** The optical device of Claim 41, the transmission optical waveguide being transverse-coupled to the multi-layer waveguide structure at a top surface thereof.
47. **(original)** The optical device of Claim 1, lateral confinement being provided by at least one lateral grating provided in at least one layer.
48. **(original)** The optical device of Claim 1, the multi-layer waveguide structure including at least one dielectric multi-layer reflector stack.
49. **(original)** The optical device of Claim 1, the multi-layer waveguide structure including at least one semi-conductor layer.
50. **(original)** The optical device of Claim 49, the multi-layer waveguide structure including alternating higher-index GaAs and lower-index AlGaAs layers.

Faxed to 703-872-9306 on 08/16/2004

Page 17 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

51. **(original)** The optical device of Claim 50, at least one lower-index AlGaAs layer being provided with at least one lateral aluminum oxide portion.
52. **(original)** The optical device of Claim 49, the multi-layer waveguide structure including alternating higher-index AlGaAs and lower-index aluminum oxide layers.
53. **(original)** The optical device of Claim 52, at least one higher-index AlGaAs layer being provided with at least one lateral aluminum oxide portion.
54. **(original)** The optical device of Claim 49, the multi-layer waveguide structure including alternating higher-index InP and lower-index InAlAs layers.
55. **(original)** The optical device of Claim 54, at least one lower-index InAlAs layer being provided with at least one lateral aluminum oxide portion.
56. **(original)** The optical device of Claim 49, the multi-layer waveguide structure including alternating higher-index InAlAs and lower-index aluminum oxide layers.
57. **(original)** The optical device of Claim 56, at least one higher-index InAlAs layer being provided with at least one lateral aluminum oxide portion.
58. **(original)** The optical device of Claim 49, the multi-layer waveguide structure including alternating higher-index InP and lower-index aluminum oxide layers.
59. **(original)** The optical device of Claim 49, the multi-layer waveguide structure including alternating higher-index GaAs and lower-index aluminum oxide layers.
60. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

Faxed to 703-872-9306 on 08/16/2004

Page 18 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure including alternating higher-index semiconductor and lower-index semiconductor layers.

61. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system [[and]] or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure including alternating higher-index semiconductor and lower-index semiconductor layers,
~~at least one of~~ the higher-index semiconductor layers [[and]] or the lower-index semiconductor layers being provided with at least one lateral oxidized portion.

62. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system [[and]] or transmitting optical signal power to the optical signal transmission system,

Faxed to 703-872-9306 on 08/16/2004

Page 19 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,

the multi-layer waveguide structure including alternating higher-index semiconductor and lower-index oxide layers.

63. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and
 - an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
- the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
- the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
- the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
- the multi-layer waveguide structure including alternating higher-index semiconductor and lower-index oxide layers,
- at least one higher-index semiconductor layer being provided with at least one lateral oxidized portion.

64. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and
 - an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,

Faxed to 703-872-9306 on 08/16/2004

Page 20 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, at least one layer of the multi-layer waveguide structure including an aluminum-containing semiconductor.

65. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and
 - an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
- the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
- the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, at least one layer of the multi-layer waveguide structure being provided with at least one lateral aluminum oxide portion.
66. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and

Faxed to 703-872-9306 on 08/16/2004

Page 21 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component, the multi-layer waveguide structure including at least one semiconductor active layer.

67. **(withdrawn)** The optical device of Claim 66, at least one semiconductor active layer being lattice-compatible with the multi-layer reflector stack.
68. **(withdrawn)** The optical device of Claim 66, at least one semiconductor active layer being lattice-incompatible with the multi-layer reflector stack.
69. **(withdrawn)** The optical device of Claim 66, at least one semiconductor active layer being an InGaAs layer.
70. **(withdrawn)** The optical device of Claim 66, at least one semiconductor active layer being an InGaAsP layer.
71. **(withdrawn)** The optical device of Claim 66, at least one semiconductor active layer being an InGaAsN layer.
72. **(withdrawn)** An optical device, comprising:
a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,

Faxed to 703-872-9306 on 08/16/2004

Page 22 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,

the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,

the multi-layer waveguide structure including at least one semiconductor active layer,

at least one semiconductor active layer being an electro-absorptive layer.

73. **(withdrawn)** An optical device, comprising:
- a transmission optical waveguide; and
 - an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween,
- the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system,
- the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
- the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
- the multi-layer waveguide structure including at least one semiconductor active layer,
- at least one semiconductor active layer being an electro-optic layer.

74. **(withdrawn)** An optical device, comprising:

Faxed to 703-872-9306 on 08/16/2004

Page 23 of 27

App. No. 10/037,966

Request for continued examination under 37 CFR §1.114
Amendment under 37 CFR §1.111

a transmission optical waveguide; and
an optical device component transverse-coupled to the transmission optical waveguide so as to enable optical signal power transfer therebetween, the transmission optical waveguide being adapted for ~~at least one of~~ receiving optical signal power from an optical signal transmission system ~~[[and]]~~ or transmitting optical signal power to the optical signal transmission system, the optical device component including a laterally-confined multi-layer dispersion-engineered waveguide structure, the multi-layer waveguide structure including at least one multi-layer reflector stack,
the optical device component being transverse-coupled to the transmission optical waveguide at the multi-layer waveguide structure, the multi-layer waveguide structure being adapted for enabling modal-index-matching between the transmission optical waveguide and the optical device component,
the multi-layer waveguide structure including at least one semiconductor active layer,
at least one semiconductor layer being a non-linear-optic layer.

75.-139. (cancelled)

Faxed to 703-872-9306 on 08/16/2004

Page 24 of 27